and that at a higher temperature of about 1700° F. the oxygen thus absorbed would be given off again, and the monoxide would apparently be restored to its original condition. The paper clearly describes the machinery required for the manufacture of oxygen by means of barium oxide.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The lecture lists for this term include the following courses:—Prof. Clifton, Magnetism; Mr. Baynes, Thermodynamics; Prof. Odling, Diacidic Olefine Acids; Mr. Veley, Physical Chemistry. Prof. Burdon-Sanderson has resumed his lectures, and Mr. Gotch is treating of the Physiology of Muscle. Dr. Tylor lectures on the Development of Religions.

An open Fellowship in Mathematics at Christ Church has been awarded to Mr. C. H. Thompson, Queen's College, Lecturer in Mathematics at Lampeter. No other mathematical Fellowship has been awarded for about seven years.

The arrangement of the Pitt-Rivers anthropological collection at the Museum is proceeding as rapidly as the constant acquisition of new material allows, and a large portion of the collection is now open for public inspection.

CAMBRIDGE.—At the next meeting of the Cambridge Philosophical Society, on Monday, February 10, the following papers will be read:—

(1) W. Bateson (St. John's), on the perceptions and modes of feeding of fishes.

(2) A. C. Seward (St. John's), notes on Lomatophloios.

(3) S. F. Harmer (King's), on the origin of the embryos in the ovicells of Cyclostomatous Polyzoa.

Prof. Stuart has communicated to the Vice-Chancellor his intention of resigning the Chair of Mechanism and Applied Science before the end of the current academical year.

SCIENTIFIC SERIALS.

American Journal of Mathematics, vol. xii., No. 2 (Baltimore, January 1890).—The number opens with the concluding part of Mr. Forsyth's paper on "Systems of Ternariants that are Algebraically Complete" (pp. 115–160). It is illustrated with numerous tables and closed with a useful abstract of contents.—In the following memoir (pp. 161–190), by Prof. Franklin, on "Some Applications of Circular Co-ordinates," the author investigates, with the aid of these co-ordinates, some interesting theorems relating to the orientation of systems of lines given in a recent volume (vol. x. p. 258) by M. Humbert. Several further illustrations are given, and the memoir closes with a discussion of the curve given by the equation $\sin x dx = \sin y dy$.—Mr. F. N. Cole writes (pp. 191–212) on "Rotations in Space of Four Dimensions." The present article is preliminary to a second paper on groups of rotations in four-dimensional space which is to follow.

Bulletins de la Société d'Anthropologie, tome xii., série iii., fasc. 3 (Paris, 1889).—Continuation of M. Dumont's paper on the natality of Paimpol, in which he treats at great length of the causes which influence the ratio of marriages contracted in every hundred of the population in the maritime districts of Brittany, and of the number of children born in each family. In both these respects the means rank amongst the lowest for all France. One cause for this may be the preponderance of women over men, a large number of the latter being engaged as seamen, or taking part in the Iceland and other distant fisheries. Another factor in this problem is probably the subdivision of property among all the members of a family, who in the peasant and small burgher classes, not uncommonly remain together all their lives, and avoid marriage in the fear of diminishing their individual shares of the patrimony. This, coupled with the repugnance, so common among the French peasantry, against large families, leads indirectly to late marriages or to celibacy, and has thus exercised a baneful influence on the normal increase of the population.—An essay on the classification of human races, based entirely on physical characters, by M. Denniker. Believing in the long persistence of types in spite of the constant intermixture of races, the author thinks that it is only by a careful study of the typical characteristics in a so-called ethnic group that we can arrive at any correct idea of the affinities between different races. In an elaborate synoptical table he enumerates the thirteen races which he proposes for his classification, adding separate remarks on the varieties of each.—The dog, by M. G. de Mortillet. Assuming from negative evidence the non-existence of the dog in the Quaternary age, the author traces his presence onwards from the Kjökkenmöddings, in which abundant remains of this animal are to be found. Passing from the prehistoric ages in Europe he considers at length the evidence that can be advanced of the existence of several varieties of the dog among the Egyptians, and later on among the ancient Greeks and Romans; and in the fact of the innumerable varieties of *Canis domesticus*, M. de Mortillet believes we have one of the most conclusive proofs of evolution.—Observations on the skeletons of two young orangs, by M. Hervé.—Pre-Columbian ethnography of Venezuela, by Dr. Marcano. The most interesting report in this treatise is that referring to the Grotto de Cerro de Luna, owing to the almost absolute certainly that it had never been entered since Guiana was first visited by white men. Here Dr. Marcano recovered fifty-two male, and forty-three female skulls, with five of children, together with numerous long bones. Among these skulls many were painted red, and others had obviously been embalmed. The general mean of their cephalic index was 79, while the facial characters were mesorrhinic and prognathic.—On correlative variations in the biceps, by M. G. Hervé.—A report of the Seventh Conference on Transformism, by M. M. Duval. The author here gives an interesting biographical notice of the great French *savant* Lamarck, entering at the same time fully into the character and scope of his researches, and showing how far his views differed from, or approximated to, those of Darwin. As a *résumé* of what Lamarck attempted on the same lines of inquiry so successfully followed by Darwin, M. Duval's report presents much interest for the English reader.—On the menhirs of Morbihan, by M. Gaillard.—On the discovery of Robenhausian flint implements near Macon, by M. Lafay.—Comparison of three sub-species of man, by M. Lombard.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, January 23.—"On a Photographic Method for determining Variability in Stars." By Isaac Roberts, F.R.A.S. Communicated by Prof. J. Norman Lockyer, F.R.S.

Some of the uncertainties which necessarily attend the determination of variability in the brightness of stars by eye observations are removed by the application of photographic methods, and particularly by that of giving two or more exposures of the same photographic plate to a given sky space, with intervals of days or weeks between each exposure.

In this way any errors caused by atmospheric, actinic, or chemical changes, together with those due to personal bias, are eliminated, and the study of stellar variability can be pursued under conditions that admit of the necessary exactitude.

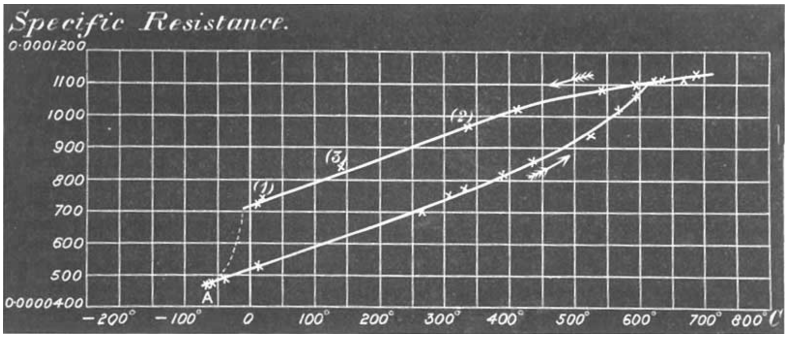
As an illustration of the applicability of this dual photographic method, the enlargement on paper from the negative is now submitted. It shows the results obtained by two exposures of the same plate to the sky in the region of the great nebula in Orion. The first exposure was of two hours' duration on January 29, and the second of two and a half hours on February 3, 1889. The stellar images formed during the two exposures are 0·0122 of an inch apart, measured from centre to centre, and therefore comparable with each other in the field of a microscope. When the images are examined in the manner thus indicated, and their diameters also measured by means of a suitably made eye-piece micrometer, it is found that at least ten of the photographed stars, the magnitudes of which are estimated to range between the 7th and 15th, have changed to a considerable extent in the short interval of five days.

The ten stars referred to are to be found within an area of less than two square degrees of the sky, and in the table given are the co-ordinates of their positions with reference to θ Orionis. The measurements of the diameters of their photo-images on a scale of 0·00002 of an inch are also given.

"Physical Properties of Nickel Steel." By J. Hopkinson, D.Sc., F.R.S.

Mr. Riley, of the Steel Company of Scotland, has kindly sent me samples of wire drawn from the material concerning the magnetic properties of which I recently made a communication to the Royal Society.[1] As already stated, this material contains 25 per cent. of nickel and about 74 per cent. of iron, and over a range of temperature from something below freezing to 580° C. it can exist in two states, magnetic and non-magnetic.

The wire as sent to me was magnetizable as tested by means of a magnet in the ordinary way. On heating it to a dull redness, it became non-magnetizable, whether it was cooled slowly or exceedingly rapidly by plunging it into water. A quantity of the wire was brought into the non-magnetizable state by heating it, and allowing it to cool. The electric resistance of a portion of this wire, about 5 metres in length, was ascertained in terms of the temperature; it was first of all tried at the ordinary temperature, and at temperatures up to 340° C. The specific resistances at these temperatures are indicated in the curve by the numbers 1, 2, 3. The wire was then cooled by means of solid carbonic acid; the supposed course of change of resistance is indicated by the dotted line on the curve; the actual observations of resistance, however, are indicated by the crosses in the neighbourhood of the letter A on the curve. The wire was then allowed to return to the temperature of the room, and was subsequently heated, the actual observations being shown by crosses on the lower branch of the curve; the heating was continued to a temperature of 680° C., and the metal was then allowed to cool, the actual observations being still shown by crosses. From this curve, it will be seen that in the two states of the metal, magnetizable and non-magnetizable, the resistances at ordinary temperatures are quite different. The specific resistance in the magnetizable condition is about 0·000052, in the non-magnetizable condition it is about 0·000072. The curve of resistance in terms of the temperature of the material in the magnetizable condition has a close resemblance to that of soft iron, excepting that the coefficient of variation is much smaller, as, indeed, one would expect it to be in the case of an alloy; at 20° C. the coefficient is about 0·00132, just below 600° C. it is about 0·0040, and above 600° it has fallen to a value less than that which it had at 20° C. The change in electrical resistance effected by cooling is almost as remarkable as the change in the magnetic properties.



Samples of the wire were next tested in Prof. Kennedy's laboratory for mechanical strength. Five samples of the wire were taken which had been heated and were in the non-magnetizable state, and five which had been cooled and were in the magnetizable state. There was a marked difference in the hardness of these two samples; the non-magnetizable was extremely soft, and the magnetizable tolerably hard. Of the five non-magnetizable samples the highest breaking stress was 50·52 tons per square inch, the lowest 48·75; the greatest extension was 33·3 per cent., the lowest 30 per cent. Of the magnetizable samples, the highest breaking stress was 88·12 tons per square inch, the lowest was 85·76; the highest extension was 8·33, the lowest 6·70. The broken fragments, both of the wire which had originally been magnetizable and that which had been non-magnetizable, were now found to be magnetizable. If this material could be produced at a lower cost, these facts would have a very important bearing. As a mild steel the non-magnetizable material is very fine, having so high a breaking stress for so great an elongation at rupture. Suppose it were used for any purpose for which a mild steel is suitable on account of this considerable elongation at rupture, if exposed to a sharp frost its properties would be completely changed—it would become essentially a hard steel, and it would remain a hard steel until it had been heated to a temperature of about 600° C.

Geological Society, January 22.—W. T. Blanford, F.R.S., President, in the chair.—The following communication was read:—On the crystalline schists and their relation to the Mesozoic rocks in the Lepontine Alps, by Prof. T. G. Bonney, F.R.S. In the debate upon the paper on two traverses of the crystalline rocks of the Alps (read December 5, 1888) it was stated that rocks had been asserted on good authority to exist in the Lepontine Alps, which contained Mesozoic fossils, together with garnets, staurolites, &c., and thus were undistinguishable from crystalline schists regarded by the author as belonging to the presumably Archæan *massifs* of that mountain-chain. In reply the author stated that he regarded this as a challenge to demonstrate the soundness or unsoundness of the hypothesis to which he had committed himself. The present paper gives the result of his investigations, undertaken in the month of July 1889, in company with Mr. James Eccles, to whom the author is deeply indebted for invaluable help. The paper deals with the following subjects:—(1) *The Andermatt Section.* By the geologists aforesaid, a highly crystalline white marble which occurs on the northern side of the Urserenthal trough, at and above Altkirch, near Andermatt, is referred to the Jurassic series (members of which undoubtedly occur at no great distance, almost on the same line of strike). The author describes the relation of the marble to an adjacent black schistose slate, and discusses the significance of some markings in the former which might readily be considered as organic, but to which he assigns a different origin. He shows that there are most serious difficulties in regarding these two rocks as members of the same series, and explains the apparent sequence as the result of a sharp and probably broken infold, as in the case of the admitted band of Carboniferous rock at Andermatt itself. That the section is a difficult one on any hypothesis the author admits, but in regard to the former of these, after a discussion of the evidence, he concludes, "that tendered on the spot demands a verdict of 'not proven'—that obtainable in other parts of the Alps, will compel us to add, 'not provable.' (2) *The Schists of the Val Piora.* These schists, already noticed by the author in his Presidential address to the Society in 1886, occur in force near the Lago di Ritom, and consist of two groups—the one dark mica-schists, sometimes containing conspicuous black garnets, banded with quartzites, the other various calc-mica schists; between them, apparently not very persistent, occurs a schist containing rather large staurolites or kyanites. On the north side is a prolongation of the garnet-actinolite (Tremola-) schists of the St. Gothard and then gneiss, on the south side gneiss. There is also some rauchwacke. This rock, at first sight, appears to underlie the Piora schists, and thus to be the lowest member of a trough. If so, as it is admittedly about Triassic in age, the Piora schists would be Mesozoic. The author shows that (1) the latter rocks do not form a simple fold; (2) they are, beyond all question, altered sediments; (3) they have often been greatly crushed subsequent to mineralization; (4) the garnets, staurolites, &c. (if not injured by subsequent crushing) are well developed and characteristic, and are authigenous minerals. (3) *The Rauchwacké and its Relation to the Schist.* (*a*) *The Val Piora Sections:* The author shows that the rauchwacké, which at first sight seems to underlie the dark mica-schist, is inconstant in position (on the assumption of a stratigraphical sequence); that its crystalline condition does not resemble that of the schist-series, but is rather such as is common in a rock of its age; that it contains mica and other minerals of derivative origin, and in places rock-fragments which precisely resemble members of the Piora schist series. (*b*) *The Val Canaria Section:* This section, described by Dr. Grubenmann, is discussed at length. It is shown that the idea of a simple trough is not tenable, for identical schists occur above and below the rauchwacké; that there is evidence of great pressure, which, however, acted subsequently to the mineralization of the schists; and that in one place the rauchewacké is full of fragments of the very schists which are supposed to overlie it. (*c*) *Nufenen Pass, &c.:* Other cases, further to the west, are described, where confirmatory evidence is obtained as to great difference in age between the rauchewacké and the schists, and the antiquity of the latter. The apparent interstratification is explained by thrust-faulting. (4) *The Jurassic Rocks, containing Fossils and Minerals.* The author describes the section on the Alp Vitgira, Scopi, and the Nufenen Pass. Here indubitable Belemnites and fragments of Crinoids occur in a dark, schistose, somewhat micaceous rock, which is often very full of "knots" and "prisms" of rather ill-defined external form, something like rounded garnets and ill-developed staurolites. These rocks at the Alp Vitgira appear to overlie, and in the field can be distinguished from the black garnet schists. In one place the rock resembles a compressed breccia, and among the constituent fragments is a rock very like a crushed variety of the black-garnet mica-schist. These Jurassic "schists" are totally different from the last-named schists, to which they often present considerable superficial resemblance; for instance, their matrix is highly calcareous, the other rock mainly consisting of silicates. Some of the associated mica may be authigenous, but the author believes much of it and other small constituents to be derivative. There is, however, a mineral resembling a mica, exhibiting twinning with (?) simultaneous extinction, which is authigenous. The knots are merely matrix clotted together by some undefinable silicate, and under the microscope have no resemblance to the "black garnets." The prisms are much the same, but slightly better defined; they present no resemblance to the staurolites, but may be couseranite, or a mineral allied to dipyre. Hence, though there is rather more alteration in these rocks than is usual with members of the Mesozoic series, and an interesting group of minerals is produced, these so-called schists differ about as widely as possible from the crystalline schists of the Alps, and do not affect the arguments in favour of the antiquity of the latter. In short, they may be compared to rather poor forgeries of genuine antiques. Incidentally the author's observations indicate (as he has already noticed) that a cleavage-foliation had been produced in some of the Alpine schists anterior to Triassic times. After the reading of this paper, Dr. Geikie stated that he had sent to Prof. Heim an abstract of the paper read by Prof. Bonney to the British Association at Newcastle, and Dr. Heim had favoured him with a *résumé* of his views on the subject of the present discussion. Having read a translation of this *résumé*, Dr. Geikie complimented the author on his courage in returning to this difficult ground, but, notwithstanding the arguments so skilfully brought forward that evening, he was not convinced of an error on the part of the Swiss geologists. Even the author's own sections gave some countenance to their views, since the dark garnetiferous schists might quite well be part of the same series as the Belemnite-schists. In metamorphic regions there must be some line, on one side of which fossils are recognizable, on the other not so. In the Alps, as Heim and his associates contend, the Belemnite-schists, which have become markedly crystalline, may be less altered portions of masses from which all trace of fossils has been generally obliterated. Remarks were also made by Mr. Eccles, Mr. Teall, Dr. Irving, Prof. Hughes, the Rev. E. Hill, and Prof. Bonney.

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[1] See Address to the Institution of Electrical Engineers (NATURE, January 23, p. 274).

Entomological Society, January 15.—Fifty-seventh Annual Meeting.—The Right Hon. Lord Walsingham, F.R.S., President, in the chair.—An abstract of the Treasurer's accounts, showing that the finances of the Society were in a thoroughly satisfactory condition, was read by Dr. Sharp, one of the Auditors, and the Report of the Council was read by Mr. H. Goss. It appeared therefrom that the Society had lost during the year several Fellows by death and had elected 24 new Fellows; that the volume of Transactions for the year extended to nearly 600 pages, and comprised 23 memoirs, contributed by 20 authors and illustrated by 17 plates; and that the sale of the Society's Transactions and other publications is largely on the increase. It was then announced that the following gentlemen had been elected as Officers and Council for 1890:—President, The Right Hon. Lord Walsingham, F.R.S.; Treasurer, Mr. Edward Saunders; Secretaries, Mr. Herbert Goss and the Rev. Canon Fowler; Librarian, Mr. Ferdinand Grut; and as other Members of Council, Mr. J. W. Dunning, Captain H. J. Elwes, Mr. F. DuCane-Godman, F.R.S., Dr. P. B. Mason, Prof. R. Meldola, F.R.S., Mr. R. South, Mr. Henry T. Stainton, F.R.S., and Mr. Roland Trimen, F.R.S. Lord Walsingham nominated Mr. J. W. Dunning, Captain Elwes and Mr. F. DuCane-Godman, Vice-Presidents for the Session 1890-91, and he then delivered an address. After remarking on the attractive beauty of some of the larger diurnal Lepidoptera, and the brilliant metallic colouring of certain species of Coleoptera, the influence that such magnificent examples of the wealth of design in Nature might have upon artistic taste, and the consequent refinement and increased enjoyment of life, Lord Walsingham referred, in illustration of the practical usefulness of entomological studies, to the successful importation into California of the Australian parasites infesting the scale insect (*Icerya purchasi*), which had proved so noxious to the orange plantations. Through the efforts of Prof. Riley, upwards of 10,000 parasites had been distributed and had since spread very widely, so that in many localities the orange and other trees hitherto thickly infested with this noxious insect had been practically cleared of it by their aid. He also referred to the successful fertilization of red clover in New Zealand by the importation of impregnated queens of the common humble-bee, and to the uses to which the silk produced by various exotic species of Bombycidæ had now been successfully applied. Reference was then made to the investigation instituted by Mr. Francis Galton, F.R.S., and to the experiments of Mr. F. Merrifield, with the view of determining the percentage of hereditary transmission to successive offspring by different generations of successors, and to the valuable auxiliary such experiments and the researches of Prof. Weismann, Mr. Poulton, F.R.S., and others might prove to the study of the laws of heredity, protective resemblance, and natural selection. It was then observed that even if the study of entomology could claim to have conferred no greater benefits upon the human race than to have afforded to many members of our urban population an inducement to improve their minds and recreate their bodies, it would have contributed in no small degree to the sum of human health, happiness, and morality; in connection with these remarks he quoted the words of the Abbé Umhang in the obituary notice of Henri de Peyerimhoff, "J'ai connu plus d'un jeune homme qui s'est passionné pour une branche de l'histoire naturelle, et je n'en ai vu aucun s'écarter du chemin de la vertu et de l'honneur." Attention was then drawn to the enormous numbers of species of Insecta as compared with the numbers of species of other orders of the animal kingdom, and an approximate estimate was made of the extent of the field of entomology, and of its relation to other branches of biological study. In connection with the subject of the principal works in entomology continued or completed during the year, special mention was made of the "Biologia Centrali Americana," by Messrs. Godman and Salvin, and the "Revisio Insectorum Familiæ Mantidarum," by Prof. Westwood. In conclusion, Lord Walsingham referred to the losses by death during the past year of several Fellows of the Society and other entomologists, mention being made of Mr. F. Bond, Dr. Signoret, Mons. Puls, Colonel C. J. Cox, Pastor Holmgren, Dr. Franz Löw, Dr. Karl Venus, and the Rev. J. G. Wood. Votes of thanks having been passed to the President, Secretaries, and Librarian, Lord Walsingham, Mr. H. Goss, Canon Fowler, and Mr. Grut replied.

Linnean Society, January 16.—Mr. J. G. Baker, F.R.S., Vice-President, in the chair.—Mr. Clement Reid exhibited and made some remarks upon a collection of fruit of *Trapa natans*, from the Cromer Forest bed at Mundesley.—Mr. J. G. Baker exhibited and described a collection of cryptogamic plants from New Guinea, upon which Mr. A. W. Bennett and Captain Elwes made some critical remarks.—In the absence of the author, Mr. A. Barclay, a paper was read by Mr. B. D. Jackson on the life-history of a remarkable Uredine on *Jasminum grandiflora*. A discussion ensued in which Mr. A. W. Bennett and Prof. Marshall Ward took part.—This was followed by a paper from Mr. Edward E. Prince, on certain protective provisions in some larval British Teleosteans.

Royal Microscopical Society, January 8.—Rev. Dr. Dallinger, F.R.S., Vice-President, in the chair.—Mr. T. F. Smith exhibited to the meeting, by means of the oxyhydrogen lantern, a series of photomicrographs of various diatoms taken with Zeiss's apochromatic objectives and projection eye-pieces, giving powers of 1000 to 7500 diameters. At the conclusion of the exhibition Mr. Smith presented the series of slides—52 in number—to the Society for future use and reference.—Mr. T. C. White exhibited a specimen of a parasite found in the cockroaches which infest sugar-ships; also a slide containing bacilli in large numbers from a urinary deposit.—A paper by Dr. R. L. Maddox, on a small glass rod illuminator, was read.—Owing to the lateness of the hour, the reading of papers by Mr. Michael and Dr. Czapski was postponed until the March meeting.

Chemical Society, January 16.—Dr. W. J. Russell, F.R.S., in the chair.—The following papers were read:—A new method of estimating the oxygen dissolved in water, by Dr. J. C. Thresh. The process is based on the fact that whereas, in the absence of oxygen, nitrous acid and hydrogen iodide interact, forming iodine, water, and nitric oxide, in the presence of oxygen the nitric oxide becomes re-oxidized, and, serving as a carrier of the oxygen, brings about an additional separation of iodine, equivalent in amount to the oxygen present; hence, deducting the amount of iodine liberated by the nitrous acid and by the oxygen dissolved in the solutions used from the total amount, the difference will be that corresponding to the oxygen dissolved in the water examined. The apparatus required is a very simple one, the analytical operations are conducted in an atmosphere of coal gas, and the results in the case of freshly distilled water agree closely with those recently published by Sir H. E. Roscoe and Mr. Lunt (Chem. Soc. Trans., 1889, 552).—Note on a milk of abnormal quality, by Mr. F. J. Lloyd. The author gave the results of an examination of the milk of two cross-bred shorthorns, and called attention to the abnormally low proportion of solid constituents other than fat.—The sulphates of antimony, by Mr. R. H. Adie.

Zoological Society, January 14.—Prof. A. Newton, F.R.S., Vice-President, in the chair.—The Secretary read a report on the additions that had been made to the Society's menagerie during the month of December 1889.—Mr. Sclater exhibited and made remarks on a specimen of a very singular duck from North-East Asia, apparently referable to the genus *Tadorna*, sent to him for determination by Dr. Lütken, of Copenhagen. After a careful examination Mr. Sclater was inclined to think that it was probably a hybrid between *Tadorna casarca* and *Querquedula falcata*.—Mr. Sclater exhibited and made remarks on a set of small birds' bones obtained from beneath some deposits of nitrate in Southern Peru, transmitted to the Society by Prof. W. Nation.—Mr. David Wilson-Barker exhibited and made remarks on some specimens of Teredos taken from submarine telegraphic cables off the Brazilian coast.—Prof. F. Jeffrey Bell exhibited and made remarks on some living specimens of *Bipalium*, transmitted to the Society by the Rev. G. H. R. Fisk, of Capetown.—A communication was read from Mr. R. Lydekker, containing an account of a new species of extinct otter from the Lower Pliocene of Eppelsheim. The author described part of the lower jaw, which he had previously referred to *Lutra dubia*, from the deposits indicated. Having, however, now seen a cast of the type of the latter, he found that the present specimen indicated a distinct species, for which the name *L. hessica* was proposed.—A communication was read from Prof. Bertram C. A. Windle and Mr. John Humphreys, on some cranial and dental characters of the domestic dog. The paper was based on the results of the measurements of a large number of dogs' skulls of various breeds. Its object was to ascertain whether cranial and dental characteristics afforded sufficient information to permit of a scientific classification of the breeds, or would throw any light upon their origin. The conclusion so far arrived at was that interbreeding had been so extensive and complicated as to make it impossible to distinguish the various forms scientifically from the characters examined. Several points with regard to the shape of head and palate and the occasional occurrence of an extra molar were also touched upon.—Mr. G. A. Boulenger read the fourth of his series of contributions to the herpetology of the Solomon Islands. The present memoir gave an account of the last collection brought home by Mr. C. M. Woodford. Besides known species, this collection contained examples of a new snake, proposed to be called *Hoplocephalus elapoides*.—A second paper by Mr. Boulenger contained a list of the reptiles, batrachians, and freshwater fishes collected by Prof. Moesch and Mr. Iversen in the districts of Delhi and Langkat, in North-Eastern Sumatra.—Dr. Günther, F.R.S., read a paper entitled "A Contribution to our Knowledge of British Pleuronectidæ." The author described the true *Arnoglossus grohmanni*, a Mediterranean scald-fish, recently discovered by the Rev. W. S. Green on the Irish coast, and quite distinct from *Arnoglossus lophotes*. Dr. Günther also stated that the Mediterranean lemon-sole (*Solea lascaris*) was specifically identical with the British species (*Solea aurantiaca*), but was distinct from that of the Canary Islands and Madeira (*Solea scriba*); and gave it as his opinion that the Mediterranean *Solea lutea* and British *Solea minuta* cannot be separated by any constant character.

EDINBURGH.

Royal Society, January 6.—Lord Maclaren, Vice-President, in the chair.—Bailie Russell read an obituary notice of the late Sir James Falshaw, Bart.—Prof. Tait read a paper on the effect of friction on vortex-motion.—Dr. A. Bruce described a connection (hitherto undescribed) of the inferior olivary body of the medulla oblongata, which has a function in the maintenance of equilibrium of the body.—Dr. W. H. Perkin read a paper on the internal condensation of some diketones.—A photograph of a group of sun-spots and of the surface of the sun was presented by Mr. James Naismith. The photograph was from a drawing made in 1864.

PARIS.

Academy of Sciences, January 27.—M. Hermite in the chair.—On clasmatocytes, by M. L. Ranvier. The author gives this name (from κλάσμα, fragment, and κύτος, cell) to certain elements which are easily detected under the microscope in the thin connective membranes of the vertebrates when they are prepared by a process here described. They are not migratory cells, but have their origin in the leucocytes, or lymphatic cells, though it is not to be supposed that all leucocytes develop into clasmatocytes.—On the theorem of Euler in the theory of polyhedrons, by M. de Jonquières. The paper deals with Lhuilier's objection, accepted by Gergonne, against the generalization of Euler's formula, which is shown to be applicable to all polyhedrons, whether convex or not. It is further placed beyond doubt that Euler not only enounced, but gave a full demonstration of the formula in question.—On the roots of an algebraic equation, by Prof. A. Cayley. Assuming $f(u)$ to be a rational and integral function, with real or imaginary coefficients, of the n order; and supposing that the equation $f'(u) = 0$, of the order $n - 1$, has $n - 1$ roots, then it is shown that the equation $f(u) = 0$ will have n roots. The demonstration rests on the same principles as those of Gauss and Cauchy.—Researches on the cultivation of the potato, by M. Aimé Girard. The author communicates the results of his experiments, continued for three years at the Ferme de la Faisanderie, Joinville-le-Pont, with the variety of the potato known as Richter's Imperator, which is shown to yield a far larger crop of starch-bearing tubers than any other variety cultivated in France. The paper was supplemented by some remarks by M. P. P. Dehérain, who stated that his own experiments fully confirmed those of M. Girard. There could be no doubt as to the great superiority of Richter's Imperator, especially as a starch-producing tuber.—Remarks on the *Annuaire du Bureau des Longitudes* for 1890, by M. Faye. In presenting a copy of this valuable annual for 1890, M. Faye remarked that the astronomic section of the work became more important every year. The present volume contains a table of the planetary phenomena, the most accurate available data for the variable stars, a catalogue of the chief stars whose magnitudes correspond to Pickering's photometric scale, papers on the use of the aneroid barometer, on the elasticity of solids and the neutral temperature of thermo-electric couples, together with the magnetic elements for France and its seaports on January 1, 1890, and at various Mediterranean stations for 1887.—On the simply rational transformations of algebraic surfaces, by M. Paul Painlevé. In this paper the author extends to the transformations in question M. Picard's method relative to the birational transformations of algebraic surfaces.—On the substitution of the salts in mixed solutions, by M. A. Étard. In his previous researches the author determined the lines of complete solubility for a mixture of potassium and sodium chlorides, varying the quantity of the *metals* saturated by the same metalloid as a function of the temperature. He studies the reverse case here, determining the results when in a solution of the same metal the *metalloids* are varied.—On the different states of iodine in solution, by MM. Henri Gautier and Georges Charpy. Iodine solutions are usually divided into two classes—brown (alcohol, ether, &c.) and violet (sulphur of carbon, chloroform, benzine, &c.). The molecular weights have been determined by Raoult's method, and results were obtained varying from 330 to 489, according to the solvent; Loeb's results are thus confirmed and amplified.—Calorimetric study of the phosphites and pyro-phosphite of soda, by M. L. Amat. These researches fully confirm the author's previous conclusion that the acid phosphite of soda, $PO_3H.NaH$, may, by the simple process of drying, lose water and become transformed into pyrophosphite of soda, a substance differing in many of its properties from the acid phosphite.—A study of the pneumococcus occurring in the fibrine pneumonia consecutive to *la grippe* (influenza), by MM. G. Sée and F. Bordas. From these clinical researches, made on a large number of patients in the Hôtel-Dieu, the authors conclude that pneumonia is not only a local affection caused by infection, but that it is itself infecting in the sense that it may invade other organs.—Papers were read by M. Chr. Bohr, on pulmonary respiration; by M. Abel Dutartre, on the poison of the land salamander; by M. Ch. Musset, on "selenotropism" (influence of moonlight on plants); by M. A. de Schulten, on the artificial reproduction of malachite all but identical in density, hardness, and crystallization with the natural stone; by M. A. de Grossouvre, on the presence of Alpine fossils in the Callovian formation of the west of France; and by M. Ch. V. Zenger, on the magnetic storms and auroræ boreales of the years 1842–57.

DIARY OF SOCIETIES.

LONDON.

THURSDAY, FEBRUARY 6.

ROYAL SOCIETY, at 4.30.—A New Theory of Colour-blindness and Colour-perception: Dr. Edridge Green.—Memoir on the Symmetrical Functions of the Roots of Systems of Equations: Percy A. MacMahon, Major R.A.

LINNEAN SOCIETY, at 8.—On the Stamens and Setæ of Scirpeæ: C. B. Clarke, F.R.S.—On the Flora of Patagonia: John Ball, F.R.S.

CHEMICAL SOCIETY, at 8.—Ballot for the Election of Fellows.—The Oxides of Nitrogen: Prof. Ramsay, F.R.S.—Studies on the Constitution of Tri-Derivatives of Naphthalene: Dr. Armstrong and W. P. Wynne.—On the Action of Chromium Oxychloride on Nitrobenzole: G. G. Henderson and J. Morrow Campbell.

ROYAL INSTITUTION, at 3.—Sculpture in Relation to the Age: Edwin Roscoe Mullins.

FRIDAY, FEBRUARY 7.

PHYSICAL SOCIETY, at 5.—Annual General Meeting.—On Galvanometers: Prof. W. E. Ayrton, F.R.S., T. Mather, and W. E. Sumpner.—On a Carbon Deposit in a Blake Telephone Transmitter: F. B. Hawes.

GEOLOGISTS' ASSOCIATION, at 7.30.—Annual General Meeting.—Notes on the Nature of the Geological Record: The President.

SOCIETY OF ARTS, at 5.—The Utility of Forests and the Study of Forestry: Dr. Schlich.

INSTITUTION OF CIVIL ENGINEERS, at 7.30.—Reclamation of Land on the River Tees: Colin P. Fowler.

ROYAL INSTITUTION, at 9.—The London Stage in Elizabeth's Reign: Henry B. Wheatley.

SATURDAY, FEBRUARY 8.

ROYAL BOTANIC SOCIETY, at 3.45.

ROYAL INSTITUTION, at 3.—The Natural History of the Horse, and of its Extinct and Existing Allies: Prof. Flower, C.B., F.R.S.

MONDAY, FEBRUARY 10.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Search and Travel in the Caucasus; an Account of the Discovery of the Fate of the Party lost in 1888: Douglas W. Freshfield (illustrated by Photographs by Signor V. Sella and H. Woolley).

SOCIETY OF ARTS, at 8.—The Electromagnet: Dr. Silvanus P. Thompson.

TUESDAY, FEBRUARY 11.

ANTHROPOLOGICAL INSTITUTE, at 8.30.—Exhibition of some Skulls, dredged by G. F. Lawrence from the Thames, in the Neighbourhood of Kew: Dr. Garson.—Characteristic Survivals of the Celts in Hampshire: T. W. Shore.

SOCIETY OF ARTS, at 8.—Cast Iron and its Treatment for Artistic Purposes: W. R. Lethaby.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Bars at the Mouths of Tidal Estuaries: W. H. Wheeler.

ROYAL INSTITUTION, at 3.—The Post-Darwinian Period: Prof. G. J. Romanes, F.R.S.

UNIVERSITY COLLEGE BIOLOGICAL SOCIETY, at 5.15.—Some Aberrant Coleoptera: S. V. Tebbs.

WEDNESDAY, FEBRUARY 12.

ROYAL MICROSCOPICAL SOCIETY, at 8.—Annual Meeting.—President's Address.

SOCIETY OF ARTS, at 8.—Modern Improvements in Facilities for Railway Travelling: George Findlay.

THURSDAY, FEBRUARY 13.

ROYAL SOCIETY, at 4.30.

MATHEMATICAL SOCIETY, at 8.—Concerning Semi-invariants: S. Roberts, F.R.S.—Ether-Squirts: Prof. K. Pearson.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.

ROYAL INSTITUTION, at 3.—The Three Stages of Shakspeare's Art: Rev. Canon Ainger.

FRIDAY, FEBRUARY 14.

ROYAL ASTRONOMICAL SOCIETY, at 3—Anniversary Meeting.

ROYAL INSTITUTION, at 9.—Problems in the Physics of an Electric Lamp; Prof. J. A. Fleming.

SATURDAY, FEBRUARY 15.

ROYAL INSTITUTION, at 3.—Electricity and Magnetism: Right Hon. Lord Rayleigh, F.R.S.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Medical Electricity and Massage: H. N. Lawrence (Gill).—A Theory of Lunar Surfacing by Glaciation: S. E. Peal (Thacker).—Einleitung in die chemische Krystallographie: Dr. A. Fock (Leipzig, Engelmann).—Elemente der Paläontologie, 2 Hälfte: Dr. G. Steinmann and Dr. L. Doderlein (Leipzig, Engelmann).—L'Évolution du Système Nerveux: H. Beaunis (Paris, J. B. Baillière).—A Theory of Gravitation: T. Wakelin (Petherick).—The Psychology of Attention: T. Ribot (Chicago, Open Court Publishing Company).—English Intercourse with Siam in the Seventeenth Century: Dr. J. Anderson (K. Paul).—Contributions to the Fauna of Mergui and its Archipelago, 2 vols. (Taylor and Francis).—Report of the Commissioner of Education for the Year 1887–88 (Washington).—The Library Reference Atlas of the World: J. Bartholomew (Macmillan).—Science and Scientists: Rev. J. Gerard (London).—Le Climat de la Belgique en 1889: A. Lancaster (Bruxelles).—Tylar's Practical Hints and Photographic Calendar, 1890 (Tylar, Birmingham).—Results of Astronomical Observations made at the Melbourne Observatory in the Years 1881–84 (Melbourne).—Babbage's Calculating Engines (Spon).—Practical Hints for Electrical Students, vol. i: Kennelly and Wilkinson (*Electrician* Office).—Lehrbuch der Meteorologie: Dr. W. J. Van Bebber (Stuttgart, Enke).—Is the Copernican System of Astronomy True?: W. S. Cassedy (Kittanning, Pa.).—New Zealand for the Emigrant, Invalid, and Tourist: J. M. Moore (S. Low).—Fauna der Gaskohle und der Kalksteine der Permformation Böhmens, Band 2, Heft 4: Dr. Ant. Fritsch (Prag).—The Extermination of the American Bison: W. T. Hornaday (Washington).—Iowa Weather Report, 1878-79-80-82-83-84-85-87 (Des Moines, Iowa).—U.S. Commission of Fish and Fisheries; Part XIV., Report of the Commissioner for 1886 (Washington).—Report on Insect and Fungus Pests, No. 1: H. Tryon (Brisbane, Beal).—La Photographie à la Lumière du Magnésium: Dr. J. M. Eder (Paris, Gauthier-Villars).—Notes upon a Proposed Photographic Survey of Warwickshire: W. J. Harrison (Birmingham).—Chinese Games with Dice: S. Culin (Philadelphia).—Ancient Symbolism among the Chinese: Dr. J. Edkins (Trübner).—Journal of the Royal Statistical Society, December (Stanford).—Charts showing the Normal Monthly Rainfall in the United States (Washington).

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